



Pistachio Task List for December, 2014
By Bob Beede, UCCE Farm Advisor, Emeritus

For farmers, there never seems to be much “down time” anymore. With harvest completed, you now have to prep ground for planting next spring, tune up the herbicide rig for your pre-emergent berm treatments, apply soil amendments, and begin your pruning and sanitation program. It is ALSO time to purchase and install a simple temperature recorder in each orchard, so that you have real-time weather data to refer to for chill accumulation and assessment of freeze events. I just went online and found I could set up a Hobo weather station complete with temperature/ relative humidity sensor and software for about \$500. I am sure there are less expensive systems, if one looks a little harder. Weather data was THE missing item to assist growers in determining how inadequate their chill portions were, and whether or not oil application would have been helpful. Every grower, large and small, should have at least one in every orchard with a different elevation or micro-climate! Chill portion accumulation began November 1!

For real time updates on chilling hours by CIMIS station, snowpack and reservoir conditions, go to my website at: http://cekings.ucanr.edu/Agriculture/Grapes_Tree_Fruits_Nut_Crops/. Select “Management” in the main menu, then “water and weather”.

Also, UC Farm Advisor, Kurt Hembree, has lots of helpful pistachio weed information at this website: http://ucanr.edu/sites/Weed_Management/files/74887.pdf.

Winter Sanitation and Navel orangeworm (NOW): Even with inadequate chilling, erratic leaf out, poor bloom overlap, and high blank nut percentages in numerous orchards, the industry still produced about 519M pounds of pistachios! Navel orangeworm pressure varied by region, but this season proved to be one of our more successful ones in keeping NOW damage to a minimum. Everyone has their own story to tell about what they did to keep their crop clean. Some described our NOW management efforts in 2014 as “lucky”, but I would have to add that in addition to any good fortune we enjoyed, there were a lot of hard working pest control advisors who kept vigil on the NOW populations and crop phenology, and treated orchards when they deemed infestation was probable. I wished I could say, “when the economic treatment threshold was reached,” but after over fifty years of research, development of such an index has escaped us. This has little to do with the scientific effort applied to this pest, and everything to do with its complex biology, multiple feeding hosts, long migration ability, and until just recently, the absence of a stable, virgin female-like pheromone for adult male monitoring. I have anxiously awaited development of the latter my entire 35 year career, and consider this feat one of the single greatest achievements in modern IPM history! It not only allows us the opportunity to monitor adult moth activity before egg production, but it also serves as the foundation for the emerging mating disruption (MD) programs for almond and pistachio. It is my professional opinion that MD applied to BOTH crops will greatly help in suppressing the regional NOW population over time. Although the professional entomologists may criticize me for this “Buck Roger’s Prediction”, I believe MD implementation over regions should occur sooner than later, since NOW moths produce fewer eggs when their mating is delayed. MD of Oriental fruit and codling moth have both shown significant population reductions after 2-3 years use. This, in conjunction with

winter sanitation, begins to break down the reproduction cycle of NOW, and hopefully brings us back to a more manageable in-season treatment program. Even though the chosen insecticide may be 99% lethal to NOW eggs and adults under controlled field tests, the problem of duplicating the coverage received in these tests over the ENTIRE TREE has thus far proven to be next to impossible. Thus, in-season sprays create a pesticide residual which, in some areas, controls NOW, and in others, does not. Thus, our sole reliance on sprays to protect our crop may never allow us to escape the pesticide treadmill we are presently on. Add the problem of getting the spray contractor to your ranch on time, **and** the time to cover your field, and you can see that the challenge of controlling NOW may get harder, not easier, if we do not begin implementing some of the new technology. Like I stated earlier, just my opinion! Better ideas are welcomed!

If this winter remains warm and dry, destruction of residual nuts remaining in the trees and on the ground is going to be especially critical to breaking the NOW life cycle. If navel orangeworm is a problem in your orchard, I would begin knocking the mummy nuts onto the ground **as soon as possible**, since you want them exposed to as much rainfall as possible for decomposition. It is well known that pistachios are NOT easy to clean up. We leave lots in the trees, in the crotches, and on the ground after harvest. The difficulty in sanitizing pistachio orchards is largely related to their small size, compared to almonds or walnuts. One pound of pistachios contains about 300 in-shell nuts compared to about 184 in-shell almonds and 50 walnuts. Pistachios are also harder to destroy. Due to their lighter weight, they resist being sucked up and broken by the flail mower. The high air velocity of some equipment used to blow the tree berms free of trash and overwintering nuts can deposit some of them into the adjacent tree row just cleaned. They also get imbedded into the soil around the base of the tree where the ground cracks loose from shaking. Depending upon how worn the rubber guards are on the shaker frame, the amount of nuts left during harvest at the base of every tree can range from a few to as much as a couple handfuls.

Because of the smaller size and larger numbers left after harvest, the overwintering sites for NOW are much higher. For every successfully overwintered NOW female, 85-100 eggs are produced in the spring. So, it does not take very many pistachios left per acre to generate a lot of moths for next year.

Observations last spring indicated the overwintering generation of NOW varied by orchard. Also, the milder winter meant higher quality mummies were available for NOW survival through June. Heavy bearing orchards also had a high incidence of pea-sized early splits in July, which provided for an earlier cross over to new crop nuts by as much as ten days compared to 2012. Dr. Joel Siegel, USDA/ARS NOW researcher states that these factors provided lots of egg-laying sites early enough in the season to cause high damage levels in many fields. Joel reports that NOW feeding on “new crop” can complete a generation in as short as 15 days, or about 500 degree-days! Cover sprays help in reducing in-season NOW, but they are no substitute for winter destruction of residual nuts from harvest. Brad Higbee, Paramount Farms NOW researcher has concluded, after 100’s of hours of detailed research, that winter sanitation is **STILL** the cornerstone of effective NOW control. His data from large sanitation trials supports this long-standing UC IPM position. Dr. Siegel also has extensive data to support this practice. So, if you do not want NOW problems, you had best do the sanitation thing to the best of your ability. Dr. Kent Daane, research associate Glenn Yokota, and I found from a three year study that there was greater and earlier NOW emergence on bare berms and in cover crops. Discing in the mummies greatly reduced the percent survival. Deep incorporation was no better than regular disking. Brad has data to show NOW larva can even crawl from beneath the soil. He is working with an Ag engineer to develop new machinery to suck and destroy the mummies. Go Brad!

Winter sanitation includes removal of mummy nuts remaining in the tree, blowing them out of the crotches at the head of the tree (this is where all the limbs arise from the trunk), blowing, and if necessary, raking the berms clean, and then DESTROYING the nuts by disking or flailing with a roller behind. This cultural practice breaks the developmental cycle of NOW **without** the use of pesticides. It is also a COMMUNITY

EFFORT! This may be one reason why some areas are more prone to high damage. NOW pressure is also most likely increasing in the southern San Joaquin Valley due to more acres of almonds, pistachios, walnuts and pomegranates.

I apologize for the continual mantra about winter sanitation. I truly share your frustration about navel orangeworm management. I look forward to the day when research data supports the use of mating disruption for NOW. I think we need technology of that type to help reduce the mated female population we are trying to control with our present cover sprays.

Pruning: The goal of a good pruning program is to manage the canopy over the life of the orchard in such a manner as to achieve the maximum possible yield of clean open split-nuts from an efficient harvest. In our quest for this goal, we must couple our knowledge of how pistachios grow and fruit with the research data developed over the past 30 years. One thing to remember about pruning is that we must think in terms of **TWO** years, rather than just **NEXT** year if we want to better manage alternate bearing. Pruning harder prior to an on-year improves the yield during an off-year, in my opinion. Dr. Ferguson and I have begun a project to test this hypothesis.

Let's first briefly review what we know about the growth and fruiting habit of pistachio. This tree is very apical dominant, meaning that it does not branch readily and grows mostly from the terminal bud and one or two lateral buds behind it. Therefore, branching must be forced by removing the end portion of a limb, known as a heading cut. Heading cuts are performed regularly during the training years to develop the desired branching. Because of pistachio's apically dominant nature, it also does not develop girth (enlargement of trunk and limb diameter) rapidly. Consequently, main structural limbs have to be headed shorter than desired in order to keep them upright.

The fruiting characteristics of pistachio also greatly influence pruning. Flower buds are born on one-year-old wood, typically towards the base of medium to long shoots and adjacent to the terminal vegetative bud on short shoots (spurs). The lack of lateral branching causes the fruit-bearing wood to become increasingly distant from the central axis of the tree. Failure to contain the tree canopy to a diameter of about 17 feet results in crop falling onto the ground at harvest due to the limited size of the harvest equipment.

Eventually, the main structural limbs bend downward during the on-bearing seasons from the weight of the crop. Without corrective pruning, the pistachio tree canopy begins to take on the appearance of an umbrella. This combination of less upright fruiting limbs and their greater distance from the tree's center creates major problems for effective harvest. The high energy imparted to the trunk by the shaker can no longer be sufficiently transmitted to the fruiting zone for its removal. Some growers attempt to solve this by simply shaking the tree harder. The result is more frequent equipment breakage, rapid sling wear (the thick rubber sheets draped around the shaker pads for protection), excessive removal of next year's fruiting wood (spurs) and possibly greater tree stress from disruption of roots at the tree's crown. Harder shaking also flings the crop past the catch frame of the harvester.

The solution to the above problem is to prune the pistachio with the objective of "pushing back" the canopy perimeter (reduce its diameter) and directing growth upward. This is accomplished principally by "thinning cuts", which is the complete removal of a limb at its point of origin. To achieve a more compact and upright tree, thinning cuts are made to flat limbs around the outside of the tree and within the canopy where excessive fruitwood exits. Care should be taken to not perform too many cuts in any given sector of the canopy unless the fruitwood is unusually abundant. In addition to distributing the thinning cuts over the entire tree, avoid removing all of the lateral limbs on a specific structural branch in order to make room for adjacent branches. Rather than creating these so-called "snakes", it is better to leave the best structural branch minimally pruned and remove the competing branch entirely. Also avoid opening the center of pistachios. We do NOT want

them to look like peach trees at the completion of pruning. Because of the growth and fruiting habits described, pistachios will naturally open up and allow sufficient light into the canopy center for fruitwood production. Loss of fruitwood in the middle of the tree over time is, in my opinion, more a function of apical dominance than insufficient light penetration. So, remember, prune to keep the pistachio canopy compact and upright for productivity and harvestability.

Above all, remember that we DO NOT want **mature** trees to be pruned to the point that they produce lots of long whips! Although this looks good, it most likely means that the tree has been over pruned. Work by Tim Spann, shows that pistachio has “preformed shoots”. These are shoots with 7-9 bud positions set **BEFORE** the season begins. Providing the tree is not excessively vigorous, these preformed shoots grow into spurs and set lots of crop. If mature trees are over pruned, these preformed shoots are “pushed” into continued growth. I believe the most productive pistachio tree is one that has hundreds of these short, preformed shoots, rather than lots of long whips.

Finally, come to PISTACHIO DAY, Wednesday, JANUARY 21, 2015, at the Visalia Convention Center, to see your buddies and have a great learning day! Please pre-register to prevent a long line and wait at the door! Here is the signup link: <http://ucanr.edu/sites/pistachioday/>. It is going to be a FULL DAY this year, so come ready for a learning marathon! Happy Farming!